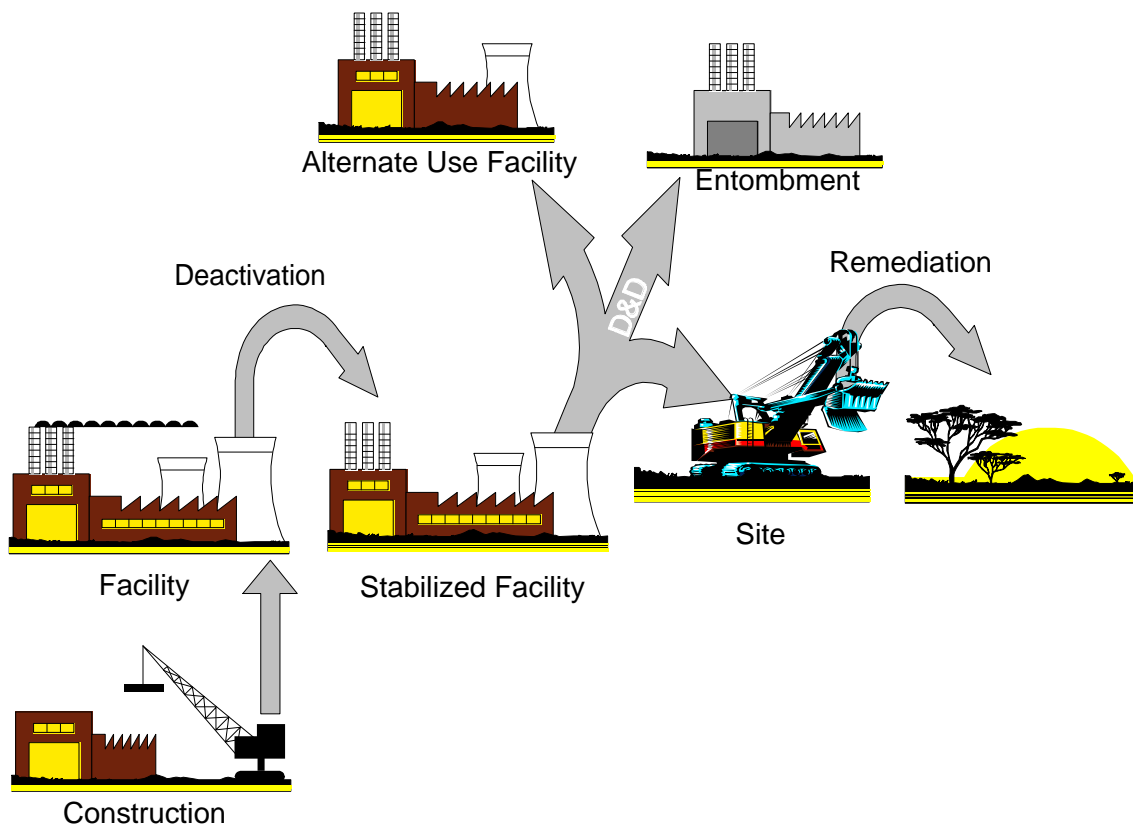


February 1997

LIFE-CYCLE TRAINING REQUIREMENTS FOR DOE NUCLEAR FACILITIES DOE ORDER 5480.20A



Prepared for the
**DOE Office of Nuclear Safety Policy
and Standards**
by the
*Nuclear Facility Personnel Qualification
Policy and Standards Program*

FOREWORD

The degree of applicability of DOE Order 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities* is based in part on the life cycle of the facility. As a facility transitions from one phase of operation to another, the applicability of DOE 5480.20A training requirements will likely change on the basis of the form and quantity of fissionable and other radioactive materials and the type of activities that are being conducted.

In addition, training requirements from many other sources should also be considered and implemented. Determining the applicability of the myriad of training requirements, while difficult in many cases, is worthwhile to ensure that resources are applied to the degree necessary to ensure safe operation under all relevant conditions.

This paper discusses the applicability of training requirements for nuclear facilities from the pre-startup phase of facility operation until the facility is shut down, decontaminated, and released for unrestricted access or other use. The focus of the training requirements discussed herein are based primarily on the requirements of DOE 5480.20A. Training requirements from other sources are mentioned briefly. Reference to training requirements from sources other than DOE 5480.20A are made solely to call attention to the requirement source. No attempt has been made to repeat these requirements.

The proposed changes to the Nuclear Safety Management rule, 10 CFR 830 (which includes training and qualification requirements) may allow other alternatives to be used in lieu of the nuclear safety management training requirements for some selected environmental restoration activities. Following the issue of nuclear safety rules, 10 CFR 830 should be carefully reviewed to determine the use of alternative requirements.

This paper is intended to be a living document and will be revised periodically to reflect changes in requirements or regulations. Beneficial comments (recommendations, additions, deletions) and any pertinent data that may improve this document should be sent to:

John A. Yoder
U.S. Department of Energy
EH-31/GTN/CXXI/3, RM2010
19901 Germantown Rd.
Germantown, MD 20874
Phone (301) 903-5650
Facsimile (301) 903-6172

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I. INTRODUCTION

A. Purpose

This paper discusses the training requirements for nuclear facilities from the pre-startup phase of operation until the facility is shut down, decontaminated, decommissioned, and, in many cases, released for unrestricted access. Since most facilities are unique in their operation and mission, each facility should address training requirements using a graded approach. DOE 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*, identifies the training requirements for nuclear facilities. Appendix A summarizes these requirements.

DOE Operations Offices should be involved early and on a regular basis in the decision processes relative to determining applicability of training requirements. This involvement will help to reduce the uncertainty and the amount of rework associated with establishing training programs.

The proposed changes to the Nuclear Safety Management rule, 10 CFR 830 (which includes training and qualification requirements) may allow other alternatives to be used in lieu of the nuclear safety management training requirements for some selected environmental restoration activities. Following the issue of nuclear safety rules, 10 CFR 830 should be carefully reviewed to determine the use of alternative requirements.

B. Scope

This paper will assist training managers, facility managers, DOE facility representatives, and others in determining the training needs for a facility as it transitions through different operational phases. As facilities transition through each phase, the applicability of DOE 5480.20A requirements need to be considered. Some of the requirements are only applicable during one or more phases. When a facility is no longer classified as a nuclear facility, DOE 5480.20A no longer applies.

II. GENERAL INFORMATION

A. DOE Order 5480.20A Requirements

DOE 5480.20A requires that a Training Implementation Matrix (TIM) be prepared by the operating contractor and approved by the cognizant Operations Office for all DOE nuclear facilities. New nuclear facilities must submit a Training Implementation Matrix (TIM) prior to start-up and operation. All other nuclear facilities currently in operation should have an approved TIM. The matrix should include the current state of compliance and projections for full implementation of requirements that are not being met at the time the facility begins operation (new facilities) or when the TIM is submitted (operable facilities).

The TIM should clearly define the organization, planning, and administration of the qualification/certification programs and describe the responsibility, authority, and methods for conducting training. It should define specifically how each of the requirements of the Order are met at the facility. For those requirements that are not met it should describe the actions to be taken and when the actions will be completed. The TIM can then be used as a planning tool for developing the required training and for tracking the completion of outstanding items.

Nuclear facilities entering the decontamination and decommissioning (D&D) phase are generally already in a shutdown status. These facilities have normally completed deactivating the facility (i.e., placing it in a stable shutdown configuration in compliance with the appropriate 5480-series DOE order) and establishing a Surveillance and Maintenance (S&M) program to maintain the facility in a safe and stable condition until decommissioning can be accomplished.

If significant quantities of fissionable or radioactive materials are not being handled, stored, or manipulated (the facility is no longer classified as a nuclear facility), a TIM is no longer needed. Such facilities will, however, need a Decommissioning Plan (required by DOE O 430.1, *Life Cycle Assessment Management*) which is required to have a section that defines the training requirements for D&D. If the TIM has been maintained current with respect to facility status, it could be used as the training section of the Decommissioning Plan required by DOE O 430.1. In addition, if the site is a Resource Conservation and Recovery Act (RCRA) site, an outline of the training program for waste handling and how it is designed to meet actual job needs is required (40 CFR 270.14) as part of the Part B RCRA permit application.

B. Safety Analysis Reports

DOE 5480.23, *Nuclear Safety Analysis Reports*, requires a safety analysis report (SAR) for all nuclear facilities. The SAR must address 21 topics, among which are "procedures and training" and "provisions for decontamination and decommissioning." Nuclear facilities are required to review and update SARs annually or as necessary. This update ensures that the information in each SAR is current and remains applicable. The guidance provided with DOE 5480.23 states that this update may be in the form of supplements or amendments submitted to DOE for approval and that the process of updating SARs must be a continuing process so long as the subject facility has not been fully decommissioned. DOE 5480.20A requires training programs to be reviewed by contractor facility management and modified to reflect changes to the SAR. Therefore, when the mission/operational phase of a facility changes and the SAR is updated to reflect the change, the training programs and the TIM should also be updated. DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23*, provides guidance and threshold values for determining if a given facility is a nuclear facility.

C. Needs Analysis

As part of developing training programs to comply with DOE 5480.20A, a needs analysis should be conducted to identify required training from sources other than the Order. Other DOE order training requirements should also be considered and the applicable requirements incorporated into facility training programs. Regulatory training requirements such as those of the Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), the Department of Transportation (DOT), etc., should also be considered and implemented as appropriate.

The requirements from sources such as these will likely remain in effect throughout the life of the facility. Their impact on the overall training effort will vary when compared to training requirements that focus on the technical aspects of the facility's primary mission. For example, when the facility is in the early stages of the pre-startup phase of operation, the inventory of fissionable and other radioactive material should not have an impact on the training requirements since none will be present. However, training requirements driven by OSHA, EPA, and perhaps DOT will be applicable, and resources will

be necessary to implement these requirements. As the facility nears the operating phase, the technical training requirements begin to be more prevalent because they are required to be in place prior to facility operation. Therefore, they begin to require a larger percentage of the resources.

Figures 1 and 2 are a graphic representation of the relative number of applicable training requirements and the relative impact of these requirements respectively from DOE 5480.20A and the sources listed in Appendix B throughout the life-cycle of a facility.

The sources listed in Appendix B include the majority of the Federal regulatory- and DOE order-driven training requirements. The sources must be carefully reviewed for applicability since no attempt has been made to identify each requirement from each source. The sources are listed as references only to call attention to the source document and its importance. Additional requirements may be imposed by local (state, county) regulations and these should be factored into the overall training program as well.

III. SPECIFIC CONCERNS

A. Pre-Startup

Because the TIM is required to be approved prior to operation of the facility, contractor management should ensure that appropriate personnel are available to develop the TIM and establish training program(s) that comply with DOE 5480.20A and other requirements. In order to accomplish this, the contractor should begin analyzing and planning early in the facility design process. Developing the TIM helps identify the necessary facility-specific training and procedures. Analysis and planning identifies resources that are required for accomplishing the required training and establishes responsibilities for carrying out the plans.

Individual facility training programs should be established that include the specific requirements of the Order as the requirements apply to the facility and the position in question. For example, each facility is responsible for comparing the requirements in the Order to their facility and the positions in the facility to determine whether the requirement applies as stated or whether an equivalent should be implemented.

If a requirement in the Order does not apply because of the type of facility or the operation, the TIM should reflect this non-applicability and contain a brief explanation of why the requirement is not applicable. The TIM is then used as a tool to track development and implementation of the training requirements that have been identified as necessary. Concurrently, needs analyses should be conducted to establish the applicability of other order- and regulatory-driven training requirements.

DOE 5480.20A requires that a systematic approach to training (SAT) be used to establish training programs for operating organization personnel. Procedures that govern SAT processes are generic and may be obtained from other facilities in DOE and be used with minor modifications. DOE-HDBK-1078-94, *Training Program Handbook: A Systematic Approach to Training*, contains guidance for systematically establishing training programs. DOE-HDBK-1074-95, *Alternative Systematic Approaches to Training*, offers other approaches and methods that have proven useful for establishing training programs. Regardless of the approach taken, analysis of the job is required to determine the necessary training. If the job changes due to mission or operational phase changes, further analysis is necessary to determine if more or less training is appropriate.

Evaluations (self-assessments and evaluations from non-facility organizations and activities) of training and qualification programs using DOE-STD-1070-94, *Guidelines for Evaluation of Nuclear Facility Training Programs*, during all phases of operation are required by DOE 5480.20A. This guide should also be used to evaluate training and qualifications that are required from other sources.

B. Facility Startup

DOE O 425.1, *Startup and Restart of Nuclear Facilities*, requires all new nuclear facilities to perform an Operational Readiness Review (ORR). It also requires nuclear facilities that are starting up following certain types of shutdowns to perform an ORR or Readiness Assessment (RA) prior to restart. Personnel training and qualification is assessed during the ORR or RA, and the training should meet the requirements of all applicable orders, including DOE 5480.20A, as they apply to the facility and the operation. Regulatory training requirements are also normally assessed as part of the ORRs or RAs.

C. Operation

The requirements of DOE 5480.20A apply throughout a nuclear facility's operation. Significant changes in facility operation or mission should be reflected in the TIM and the training program adjusted accordingly. For example, if a hot cell facility undergoes modifications to facilitate working with quantities of fissile materials where fissile materials were not previously worked with, the TIM should be revised to reflect the changes.

Changes might include the requirements that were implemented to address training and certification of the operating staff to address both the fissionable material handler requirements from the Order and the modifications that were made to support the new operations. Because the TIM is intended to be a living document, substantive changes made to the TIM resulting from changes in operations must be approved by DOE.

D. Standby/Shutdown

When the facility or activity is officially placed in a standby/shutdown condition, maintaining qualifications and/or certifications for all personnel is one method for ensuring that personnel are capable of performing their jobs safely and efficiently. However, this method may not be cost-effective for many positions or programs, especially if surveillance is the only task being performed. Just-in-time training to qualify/certify personnel to perform these evolutions may solve this problem effectively. Provisional qualification for specific evolutions or qualifying only the personnel necessary to support the evolution may also meet the needs of the facility and be cost-effective, efficient approaches.

During this phase of operations, training requirements from DOE 5480.20A and from sources other than DOE 5480.20A are normally still applicable. Training requirements from other sources may even begin to make up the majority of the training programs for many positions. This situation is likely because generally the facility is preparing for D&D and is handling hazardous wastes or preparing to disassemble systems, components, and/or structures.

Often the operability of the facility or activity is questionable. DOE 5480.20A defines an operable nuclear facility as:

...the state of being operated or has the potential for being operated to fulfill the mission it was designed for. A facility that cannot be operated on a day-to-day basis because of refueling, extensive modifications, or technical problems is still considered to be operable. A facility that has been officially placed in a standby or shutdown condition, or in an environmental remediation status, but in which personnel manipulate or handle fissionable materials, radioactive materials, or tritium in such form and quantity that a nuclear hazard potentially exists to the employees or the general public, or manipulate the controls of equipment used to produce, process, transfer, or store such materials, is also considered operable.

If the facility is considered operable, DOE 5480.20A applies. A TIM is still required, but many requirements or parts of the requirements that were applicable during facility operation may no longer apply. The number of personnel required to be trained should also have decreased. However, during the standby/shutdown phase, special training may be required to complete evolutions and activities which are abnormal, unique, or for which personnel have not previously been qualified. The methods mentioned in the first paragraph of this section can be used to prepare personnel for situations such as these. Although not specifically required by the Order, it may be of benefit to the facility to carefully review the TIM when entering this phase of operations. In cases where revision to the TIM is determined to be of value, consideration should be given to selectively applying the requirements of DOE 5480.20A.

For example, it may be appropriate to prepare and submit a training plan/TIM that describes the actions being taken to meet the requirements of DOE 5480.20A as they presently apply to the facility or activity. In such cases the industry standards, DOE order requirements, and other DOE standards, or parts thereof, can be identified and referenced rather than developing a point-by-point comparison matrix.

E. Decontamination and Decommissioning (D&D)

Nuclear facilities entering the decontamination and decommissioning (D&D) phase of their life cycle must define the training program in the Decommissioning Plan required by DOE O 430.1, *Life Cycle Assessment Management*. To provide additional guidance relative to D&D, the DOE Office of Environmental Restoration has prepared a *Decommissioning Resource Manual, DOE/EM-0246*. The Resource Manual does not specifically address DOE 5480.20A in its discussion of training; however, it is included in the references, and application of DOE 5480.20A is an effective approach for identifying training program content and is required if the facility is classified as an operable nuclear facility.

The *Decommissioning Resource Manual* also encourages completion of a comprehensive needs analysis to further identify and define the training needs of the facility. These needs are unique to each facility, and the needs analysis will help define core requirements for training and qualification plans.

Specific D&D training requirements typically include:

- Occupational Health and Safety Administration (OSHA) hazards communication training (29 CFR 1910.1200)
- Fire suppression equipment and response training
- Fire brigade training
- Chemical hygiene plan/laboratory safety training
- Training in the use and maintenance of personal protective equipment appropriate to the level of expected use
- Hazardous waste operations and emergency response (HAZWOPER) training (29 CFR 1910.120)
- Medical monitoring program training
- Radiation protection training (10 CFR 835)
- Training in the safe handling, storage, transport, and disposal of hazardous and highly hazardous chemicals
- Emergency management training (contingency plans, evacuation plans, alarm type and awareness, responsibilities, etc.).

Other Federal environmental requirements which may apply to the decommissioning process are the: National Environmental Policy Act (NEPA), Atomic Energy Act (AEA), Clean Water Act (CWA), Toxic Substance Control Act (TSCA), and National Emission Standards for Hazardous Air Pollutants (NESHAPS) under the Clean Air Act (CAA), to name a few.

Additional requirements may be imposed by local (state, county) regulations and these should be factored into the overall training program as well. In some cases these local regulations are more restrictive and require more attention and resources than expected.

As one training manager put it - "We are under much more scrutiny than we were during operation, because of the increased number of agencies interested in what we are doing (i.e., the state Environmental Protection Agency, the US EPA, OSHA, DOT, and the DNFSB). Not to mention all of the different individuals, auditors, and sections within DOE."

If the facility is an operable nuclear facility as defined by DOE 5480.20A, the training program must meet the requirements of the Order as described in the TIM. However, as previously noted, many of the requirements that applied to facility operations will no longer be applicable. Facilities that have an approved, current TIM with training programs that meet the applicable requirements of DOE 5480.20A can modify the TIM to reflect only the applicable requirements for the present status and include any additional specific requirements for D&D.

Facilities that do not have an approved TIM in place or are not required to meet the requirements of DOE 5480.20A should establish training programs that follow the guidance in the *Decommissioning Resource Manual* and/or RCRA for operations and operations support personnel.

10 CFR 830.120, *Quality Assurance Requirements*, also contains personnel training and qualification requirements. This rule requires that personnel be trained and qualified to ensure they are capable of performing their assigned work (initial training) and continuing training to ensure job proficiency is maintained.

The *Decommissioning Resource Manual* recommends that prior to the actual performance of decommissioning operations an independent organization conduct an appropriately graded readiness review to ensure that workers are trained, and that the organization performing the decommissioning operations is otherwise prepared. In cases where the decommissioning operations are conducted by completing individual sequenced projects, a readiness review/assessment may be required prior to the performance of each project. In either case, it should be determined that the workers are adequately trained in accordance with the applicable DOE Orders and other regulations.

RCRA and/or the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) may apply to a facility; however, all DOE facilities should follow the framework described in the *Decommissioning Resource Manual*, which includes the preparation and submittal of a Decommissioning Plan that defines the training program.

In addition, RCRA specifies minimum initial and continuing training requirements for waste handling at Treatment Storage and Disposal (TSD) sites (40 CFR 262.34 and 264.16) and requires the submittal

of an outline of the training program and how it is designed to meet actual job needs with the Part B permit application (40 CFR 270.14).

DOE facilities that are licensed by the NRC or other NRC-licensed facilities for which DOE has decommissioning responsibility are decommissioned in accordance with an NRC approved Decommissioning Plan. These plans should also contain a description of the training program for individuals conducting the decommissioning operations.

IV. TRANSITION

A. Pre-Startup to Operation

Nuclear facilities transitioning from the pre-startup phase to the operational phase should have training and qualification programs established to meet the requirements of DOE 5480.20A as determined by job and needs analyses. When job requirements change, further analysis is necessary to determine if more, less, or different training is needed to ensure personnel are adequately trained to perform the job. Periodic evaluations of the training programs should be conducted after the facility begins to operate. Program content should be monitored and necessary revisions made to include changes in areas such as policies and/or procedures, system or component design, job requirements, regulatory requirements, and industry guidelines or commitments throughout the operating life of the facility.

These evaluations should be conducted by management, operations personnel, training personnel, and DOE personnel using DOE-STD-1070-94, *Guidelines for Evaluation of Nuclear Facility Training Programs*, to ensure that training and qualification programs comply with the applicable portions of the Order, and that the programs are effective in producing and maintaining a qualified workforce. In addition, an ORR or RA may be required whenever a change in operational phase occurs or after certain shutdowns prior to restart.

B. Operation to Standby/Shutdown

Nuclear facilities transitioning from an operational status to either a shutdown or standby status should carefully review training requirements, based on the facility's condition, against the requirements of DOE 5480.20A.

The facility should determine whether significant quantities of fissionable material, radioactive materials will be processed, stored, handled, or manipulated in a form and quantity that represents a potential nuclear hazard to the employees or the general public. If any of the above is the case, the facility is considered operable and is required to meet DOE 5480.20A requirements. Another "thumb rule" for determining if a facility is operable is the determination of applicability of other DOE nuclear safety orders/rules. If other DOE nuclear safety orders/rules are applicable, it is reasonable to conclude that DOE 5480.20A is also applicable.

If it is determined that the facility is not operable, and therefore DOE 5480.20A is not applicable, it is still necessary to submit the training requirements along with the update to the SAR in accordance with the guidance provided in Attachment 1 of DOE 5480.23. DOE Operations Office concurrence should be obtained in either case.

Facilities placed in either a standby or shutdown condition should also submit an updated SAR that defines the training requirements in accordance with the guidance provided in Attachment 1 of DOE 5480.23. These requirements should be consistent with the requirements of DOE 5480.20A. The TIM should be revised to identify changes in training requirements when a facility is placed in standby/shutdown. For example, a reactor facility placed in a standby status with fuel in the reactor should maintain certified reactor operator positions, whereas a reactor from which the fuel has been removed may only need certified fuel handlers if the fuel is stored at the facility.

Facilities placed in a standby/shutdown condition should identify training needs through job and needs analyses. These analyses should include a careful review of the applicability of the requirements of DOE 5480.20A, as well as from other sources. Establishment of these requirements should recognize that a facility may be in the S&M condition for a significant period of time (greater than 2 or 3 years) and it is likely that the operations and maintenance staff will change. This attrition requires diligence in complying with the applicable requirements of the Order.

C. Standby/Shutdown to D&D

Nuclear facilities transitioning from the standby/shutdown phase to the D&D phase will have different training requirements. In this

phase the programs may still need to be established in accordance with DOE 5480.20A on the basis of the inventory of radioactive or fissionable materials. The facility should update the SAR to identify any required changes to the qualification and/or certification programs. A Decommissioning Plan must be developed by the contractor and approved by the DOE Operations Office (and in some cases the Secretarial Office). The transition to a non-nuclear facility should also be considered in the Decommissioning Plan.

One of the essential elements of a Decommissioning Plan is that all training requirements are identified and training programs developed to address these requirements. Training for specific systems or operations should be based on the job/needs analysis and may need to be modified to accommodate using the system or component to place the system in a permanent shutdown configuration. Operation of systems and components to perform various unique functions may occur very frequently during this phase and require numerous and varied training approaches.

This requires the training organization to be intimately involved with the project to stay abreast of the many changes that occur.

As indicated by this quote from a training manager.

"We have started up more systems, processes, and facilities than we did when we were operating. Many issues seem to occur which established technologies don't account for. These issues include, many design changes, construction changes, and complete technologies changes. We have trained hundreds of hazardous workers on systems and processes only to have to retrain them on changes or new processes the next month."

As systems are deactivated and removed from service, the training for these systems should be removed from the training program. When all significant quantities of radioactive materials, fissionable materials, and tritium have been removed, concurrence has been received from the Operations Office, and the facility is no longer considered a nuclear facility, DOE 5480.20A no longer applies. If a TIM is in place, and the TIM has been maintained current to reflect the facility condition throughout the life-cycle of the facility, the TIM should meet the requirement for defining the training program in the Decommissioning Plan.

V. SUMMARY

Operable nuclear facilities are required to have a training program developed and implemented that meets the requirements of DOE 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*. Facilities must develop a Training Implementation Matrix (TIM) before facility operation and maintain the TIM as a living document reflecting any significant changes throughout the life of the facility.

DOE Operations Offices should be involved early and on a regular basis in the decision process relative to determining applicability of training requirements. The TIM is approved by the DOE Operations Office and any changes to the TIM must also be approved by DOE.

Facilities which change operational status should also submit an update to the SAR which defines the training requirements in accordance with the guidance provided in Attachment 1 of DOE 5480.23. These requirements should be consistent with the requirements of DOE 5480.20A and based on job and needs analyses. In addition, an ORR or RA which assesses personnel training and qualification programs against established requirements may be required whenever a change in operational phase occurs or after certain shutdowns prior to restart.

Facilities transitioning to a standby, shutdown, or D&D status should determine if there is a potential nuclear hazard (i.e., is the facility still classified as a nuclear facility?) and that training that ensures safe performance of required evolutions based on job and/or needs analyses is in place.

If DOE 5480.20A is not applicable (i.e., the facility is no longer classified as a nuclear facility), changes to training requirements should be submitted along with the update to the SAR. DOE Operations Office concurrence or approval should be obtained in either case.

Facilities in the D&D phase that are no longer considered operable nuclear facilities are required to have a Decommissioning Plan in place to meet the requirements of DOE O 430.1, *Life Cycle Assessment Management*.

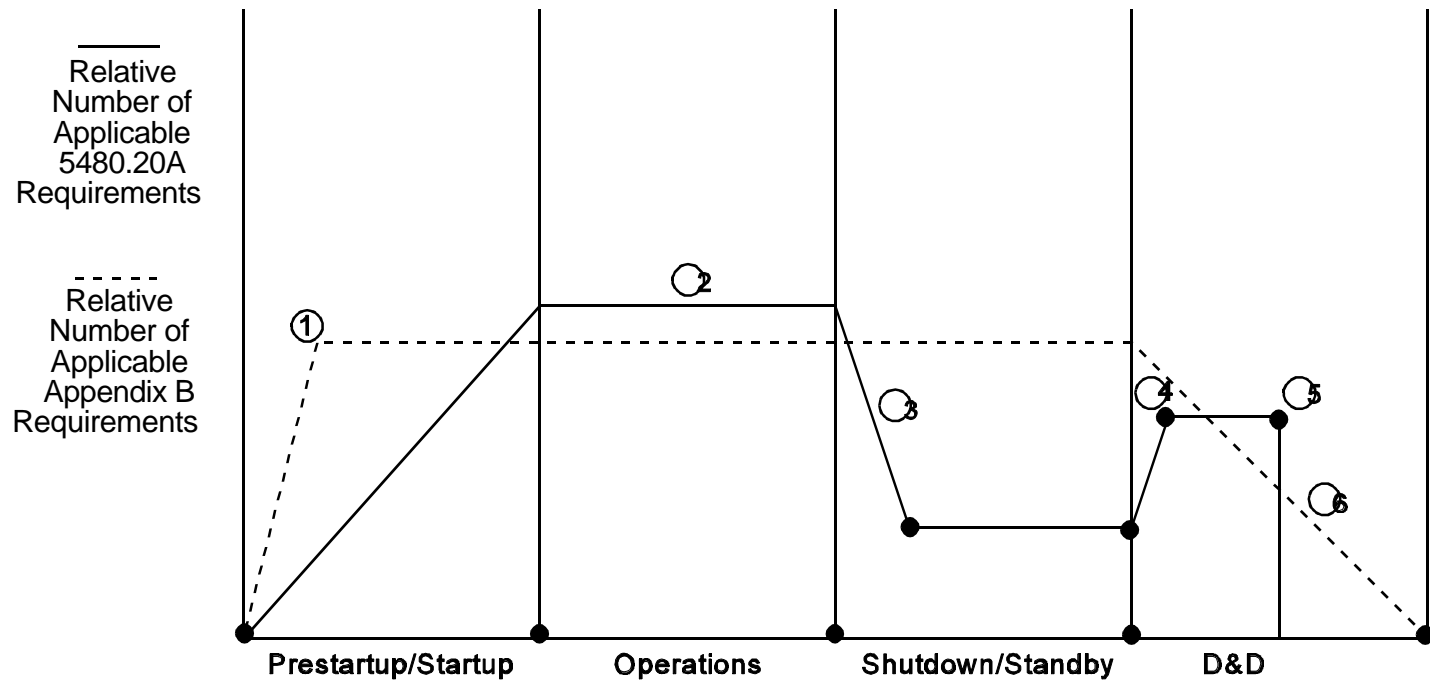
This plan should contain training requirements and training programs that adequately address training and qualification requirements to ensure that personnel are adequately trained as described for D&D. An approved TIM that accurately reflects the training requirements and the methods for accomplishing and administering the training should satisfy this

requirement. If the facility is a RCRA TSD, an outline of the waste handler training program and how it is designed to meet actual job needs must be submitted with the Part B RCRA permit application.

The training organization must become involved in all facets of the project in order to stay abreast of and respond to the many changes that occur.

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Comparison of Relative Number of 5480.20A and Appendix B Applicable Training Requirements Throughout Nuclear Facility Life



1. Sharp increase because many activities taking place (construction, handling hazardous materials and chemicals) therefore, many requirements applicable almost instantaneously.
2. Remains constant because all requirements now applicable including retraining/recertification.
3. Sharp drop due to nonapplicability of operational-related requirements.
4. Increase due to increase in hazardous activities (fuel handling, decon., etc.) (assume D&D < 2 years and no facility operations required).
5. 5480.20A no longer applicable, no longer a nuclear facility.
6. Gradual decrease due to decrease of hazardous materials, chemicals, radioactivity, etc.

Figure 1

Relative Impact of 5480.20A and Appendix B Training Requirements Throughout Nuclear Facility Life

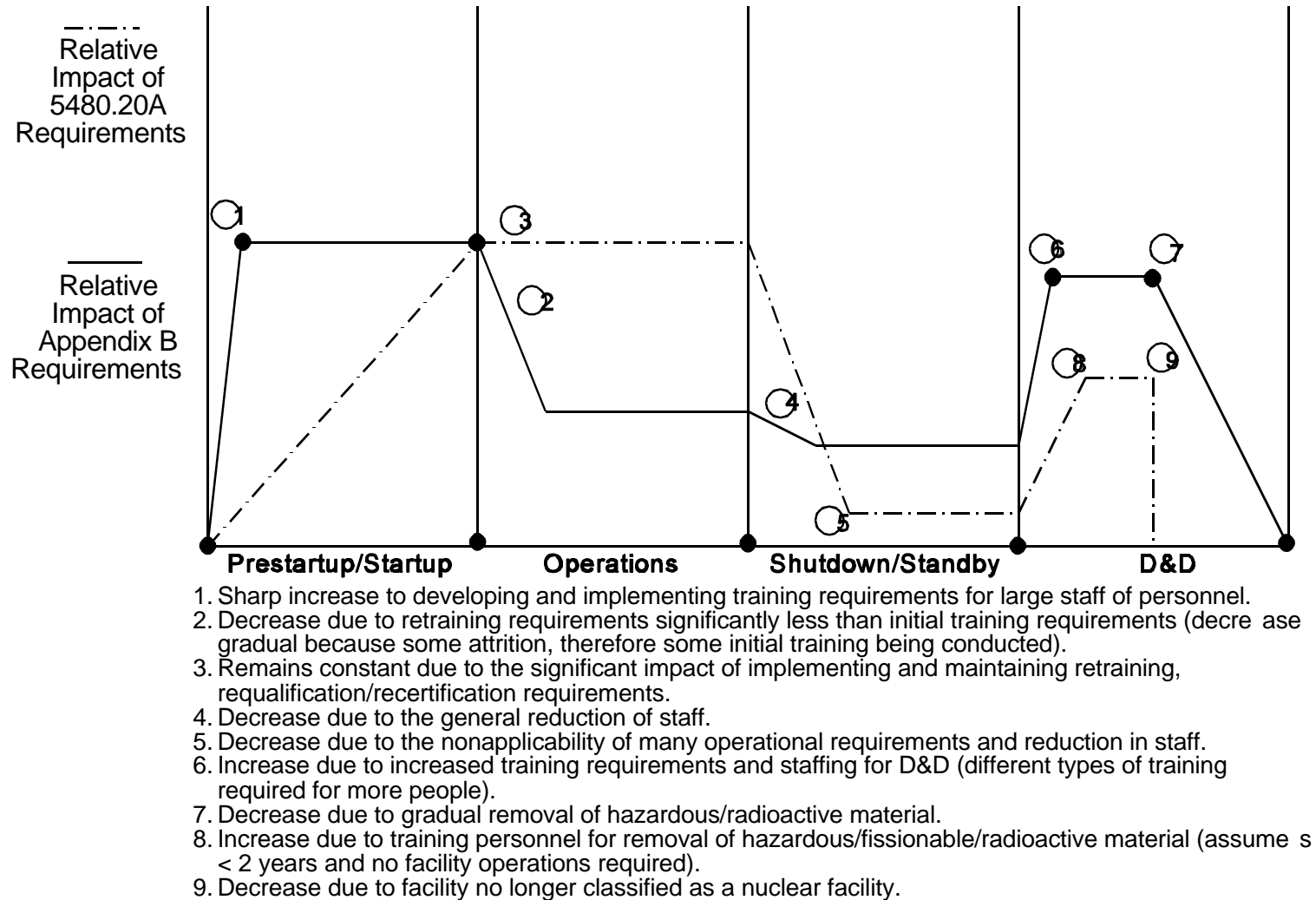


Figure 2

APPENDIX A

DOE 5480.20A TRAINING REQUIREMENTS

DOE 5480.20A requires that a graded systematic approach to training be used for establishing training and qualification programs for operations, maintenance, and technical staff personnel at all operable DOE nuclear facilities. General requirements contained in DOE 5480.20A include the following elements:

- Establishment of a training organization
- Training of subcontract personnel
- Personnel selection
- Qualification process
- Certification process
- Initial and continuing training
- General employee training
- Probabilistic risk assessment training
- Technician and maintenance personnel training
- Technical staff personnel training
- Management and supervisory training
- Operator and supervisor examination and reexamination requirements
- Requalification requirements
- Exceptions to training requirements
- Extension of certification/qualification
- Alternatives to education and experience
- Operational evaluation contents for certified positions.
- Performance demonstrations for qualified positions.
- Control manipulation requirements for certified positions.
- Training records

Specific requirements include the following elements:

- Entry level education and experience
- Medical examinations
- Engineering expertise on shift (Category A reactors)
- Simulator requirements (Category A reactors)
- Specific operator training
- On-the-job and classroom training
- Additional training (as applicable) for fissionable material handlers and supervisors in appropriate topics from the Order
- Operator, fissionable materials handler, and supervisor proficiency requirements for certified positions.

APPENDIX B

OTHER TRAINING REQUIREMENTS

This list is not intended to be all inclusive. Some or all of the following training requirements may apply to a nuclear facility depending on the processes involved and the facility's overall mission.

GENERAL INDUSTRY TRAINING REQUIREMENTS 29 CFR 1910

- Signs, Tags, and Lockout/Tagout (also DOE Order 5480.19)
- Fire Protection (e.g., fire extinguishers, fire watch, fixed extinguishing systems, local fire alarm signaling systems, emergency brigade, etc.)
- Evacuation Signals
- Exposure and Medical Records (e.g., existence, location, availability, rights of access, etc.)
- Hazards Communication
- Asbestos (also 59 FR 40975)
- Emergency Preparedness and Response (also see DOE Order 5500.3A)
- Toxic and Hazardous Chemicals and Materials (e.g., hydrogen, anhydrous ammonia, benzidine, lead, hydrazine, etc.)
- Compressed Gas and Air Equipment
- Powered Platforms, Manlifts, and Vehicle-Mounted Platforms
- Occupational Health and Environmental Control (e.g., ventilation, occupational noise exposure, ionizing radiation, etc.)
- Personnel Protective Equipment (e.g. respiratory protection)
- First Aid
- Hoisting and Rigging (also see the DOE Hoisting and Rigging Manual)
- Confined Space Entry
- Machinery and Machine Guarding
- Welding, Cutting, and Brazing

OTHER GENERAL TRAINING REQUIREMENTS

- Safeguards and Security Awareness, DOE Order 5631.1C.
- Computer Security, DOE Order 1360.2B.
- Reporting Requirements and Rights, DOE Order 5483.1A.
- Quality, 10 CFR 830.120.
- Equal Employment Opportunity, DOE Order 3220.2A, Executive Order 11246, and 41 CFR 60-2.21.
- Occurrence Reporting, DOE Order 5000.3B.
- Reporting Fraud, Waste, and Abuse, DOE Order 2030.4B.

- Heat and Cold Stress and Work on High Temperature/Pressure Systems .
- Radiation Protection, 10 CFR 835, DOE -N-5480.11, 29 CFR 1910.96, and 29 CFR 1926.53.
- RCRA/Treatment Storage and Disposal(TSD), 40 CFR 265.16 and 29 CFR 1910.120.
- Conduct of Operations, DOE Order 5480.19
- Safe use of Tools and Equipment (e.g., power tools, lasers, mechanical aids, etc.)
- Proper Lifting and Carrying, NIOSH 81-122
- Unresolved Safety Questions (USQ), DOE Order 5480.21
- Fitness for Duty, 10 CFR 710, and DOE Order 5631